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Five Steps in Pasture Improvement

By E. D. Walker and J. C. Hackleman[1]

WHAT'S WRONG WITH OUR PERMANENT PASTURES? For various good reasons, much Illinois land too sloping or broken or eroded for field crops has been devoted indefinitely to pasture and used for livestock grazing. Yet most of it is not producing nearly as much as it should.

Apparently too many of us still cling to the ideas that pasturing builds up soil and that pastures need no soil treatment. We forget that each pound of meat and each quart of milk produced on a pasture remove plant food from the soil. Animal droppings return part of the plant food but not the part that walks off the field as bone, milk, and meat. When we take 50 bushels of corn from a field, we expect to put something back to replace the lost fertility, but we sometimes forget that 10,000 pounds of milk takes away more nitrogen than the corn, as much phosphorus, nearly twice as much potassium, and twenty-four times as much calcium. A thousand pounds of beef contains half as much nitrogen as a 50-bushel corn crop, about the same amount of phosphorus, and twenty-five times as much calcium. Instead of building up the soil, pasturing — unless plant food is added — merely slows up the process of running it down.

Many pastures are on poor soil. Pastures are no better than the soil they grow on. Some are unproductive because they have been grazed for seventy-five years or more with little or no soil treatment. Others are on fields that were farmed until they were eroded and worn out as cropland and were then seeded to pasture without soil improvement. Small wonder that a great many pastures are little more than exercise grounds during much of the year.

Many pastures are overgrazed. Because depleted pastures yield only small amounts of inferior forage, they are usually badly overgrazed by hungry animals that get sunshine and fresh air but

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This cow has to work long hours to get a little feed from a depleted, weedy, overgrazed pasture. Like thousands of acres of similar Illinois land, the land could be made to yield high amounts of good feed.

little feed. The closely grazed plants provide such poor cover that they cannot prevent losses of water and soil as a good pasture can. Rainfall runs off instead of soaking into the ground and sloping fields erode badly.

Too many weeds, not enough pasture. Inferior pastures are further handicapped by weeds and even by brush and small trees. It takes as much water and plant food to produce a pound of ragweed as a pound of good forage. Yet many farmers who would not expect a good yield from a weedy field of corn are not concerned about weeds in the pasture. The weeds compete with the desirable plants for sunlight, plant food, and moisture, so that the good pasture plants cannot grow well and are often crowded out entirely.

How can we make the poor pasture good? Good pasture is possible on every farm. Farmers in all parts of the state have found that the forage yield of the average permanent pasture in Illinois

can easily be doubled and the quality of forage greatly improved. The way to do this is fairly simple.

Pasture is a crop like corn, small grain, and soybeans, so the same general practices that build up yields of rotated crops — ample plant food, well-prepared seedbed, high-quality adapted seed, and good care — will work for worn-out permanent pastures. Specifically, for pasture crops the five important steps are:

1. Test and treat the soil.
2. Tear up the old sod.
3. Seed desirable legumes and grasses.
4. Control grazing.
5. Control weeds by clipping.

STEP 1: TEST AND TREAT THE SOIL

For really good results, a pasture must produce a mixture of legumes and grasses — at least one deep-rooted legume is desirable. Legumes are palatable and nutritious, and if inoculated they supply a large amount of nitrogen to the companion

This farmer is applying the limestone called for by the tests. Phosphate and other fertilizers will be added at seeding time.

grasses and make them also more productive, palatable, and nutritious. But to grow these legumes the soil must be sweet and well supplied with minerals. Most poor pastures in Illinois are poor because the soil on which they are growing is low in one or more of the essential minerals. A soil test will show which minerals a soil needs and how much of each is needed to correct the deficiency.

So your first step is to test your soil for acidity, phosphorus, and potassium. Your farm adviser can tell you how to take the samples and where they can be tested; all counties have a soil-testing service available. The report of the tests will show the kinds and amounts of soil treatments your soil needs.

If you find your soil needs lime, put it on at least six months ahead of the time you seed legumes. Apply phosphate and potash when the seedbed is being prepared.

STEP 2: TEAR UP THE OLD SOD THOROUGHLY

The minerals applied as the result of the soil test will not be fully effective until they are mixed with the surface soil. Spreading them on top of the old pasture is not enough. The pasture should be torn up. Tearing up the pasture does three things:

It destroys or weakens the old sod and keeps it from competing too quickly with the new seeding.

It mixes the needed soil treatment with the topsoil.

It helps prepare the seedbed for the new legumes and grasses.

The job must be done thoroughly. Too often the sod is not torn up enough to form a fine, firm seedbed.

How best to do the job depends on the amount of vegetation on the surface and the nature and contour of the soil. On level to moderately sloping land, plowing makes a better seedbed and usually gives best results. This is especially true if the sod is heavy or there is considerable growth of weeds or grass on the surface. If the sod is thin and there is little top growth, the disk or field cultivator will do a satisfactory job. Whether you plow or disk, be sure to work sloping land on the contour.

In heavy sod, plowing insures a good seedbed. Plowing also gets rid of grasses and weeds which might compete with the new seeding. Always plow sloping fields like this on the contour.

On steep hillsides where plowing is not practical, use a disk, field cultivator, or similar tool. Cultivate across the slope on the contour to help prevent erosion. Some farmers like to cut the sod the first time up and down the slope and then do the remaining work on the contour.

Where sod is not too heavy, a satisfactory seedbed can be prepared with a field cultivator. The mulch of sod on the surface helps to control erosion.

A disk can be used to cut up light sods or to work up the seedbed following plowing. Both the disk and the field cultivator are good tools to use on land too steep to plow.

If you use a disk or other tool of this type to tear up the pasture, spread the limestone and other fertilizer materials on the surface and let the cultivation work them into the soil. If you plow, spread the materials on top of the plowed ground and work them into the soil with a disk or harrow as the seedbed is prepared.

A firm, carefully prepared seedbed pays off by insuring a better stand. The more nearly the seedbed approaches the condition of a good garden the better — mellow but firm, smooth with no large clods, and preferably rolled to firm the soil just ahead of the seeding.

STEP 3: SEED DESIRABLE LEGUMES AND GRASSES

After you have applied the soil treatment and prepared the seedbed, the next step is to seed legumes and grasses that do well in your area. Try to establish a mixtures of both types of plants. Legumes fix nitrogen and supply high-quality forage; the deep-rooted ones are drouth-resistant. The grasses aid in erosion control and help protect the legumes against heaving and other winter injury. A good percentage — about half — of grass in the mixture helps to prevent bloat.

The kind and amount of legume and grass seed you will want to use in your pasture will depend on what part of the state you live in, whether your soil offers a moisture problem, and what type of soil you have and how fertile it is.

In choosing your seeding mixture, shoot for a fifty-fifty combination of grasses and legumes like this one.

Grasses. In central and northern Illinois, most farmers prefer bromegrass, timothy, and orchard grass, with reed canary grass useful in areas that tend to stay wet. In southern Illinois, these same grasses are adapted to the more fertile soils. In addition redtop and tall fescue (Alta or Kentucky 31) can be used on less fertile soils.

The southern strains of bromegrass (Achenbach, Lincoln, Fisher, and Elsberry) are recommended for all parts of the state.

Legumes. You can choose from several legumes.

Alfalfa may well be your major legume if your soil has been treated and drains well. Use one of the new varieties resistant to bacterial wilt, either Buffalo or Ranger. Because it is a perennial, alfalfa is especially desirable where it can be grown.

Sweet clover grows well on a wide variety of soils in all parts of the state, if the soil is sweet and the sweet-clover weevils are not too numerous. Since it is a biennial, it is somewhat difficult to maintain in a pasture stand.

Red, mammoth, and alsike clovers are other good deep-rooted legumes which are widely used.

Ladino clover is an excellent addition to pasture mixtures, especially on well-treated soils and with ample rainfall.

Birdsfoot trefoil is a long-lived perennial which is especially good for pastures that are to be left down for several years. Since the seedlings start slowly and are easily choked out by other more vigorous plants, stands are not always obtained unless care is taken to avoid or eliminate this competition. When once established, this legume will grow on a wide range of soils, from those which are sandy or thin and inclined to be drouthy, to soils which drain poorly where alfalfa will not do well. Use New York strains of seed as the foreign strains of birdsfoot trefoil are not adapted for use in pastures.

Lespedeza is excellent in mixtures in central and south-central Illinois, and should be included in all pasture seedings in southern Illinois except those with birdsfoot trefoil. There is some evidence that birdsfoot trefoil does not thrive in company with lespedeza.

Many combinations of the different legumes and grasses have been successfully used by Illinois farmers. Here are just a few suggestions. **Amounts of seed are for one acre.** Relatively heavy seeding rates are advised because it is often difficult to work up an ideal seedbed in a pasture-renovation program.

Mixtures for northern Illinois. If oats are used as a nurse crop, seed only 1 bushel an acre.

For renovated pastures on medium to good soils:

A

Alfalfa.....8 pounds
Red clover.....2 pounds
Ladino.....½ pound
Bromegrass or timothy.....6 pounds
(Substitute 6 pounds of birdsfoot trefoil for the alfalfa and Ladino for rolling, drouthy areas and gravelly knobs and rocky slopes.)

B

Alfalfa.....10 pounds
Bromegrass.....5 pounds
(Has given good results on fertile soils.)

For pastures hard to renovate properly because of topography:

Birdsfoot trefoil.....6 pounds (special inoculant required)
Red clover.....2 pounds
Timothy.....3 pounds
Bromegrass or tall fescue.....3 pounds
(Omit nurse crop because birdsfoot trefoil does not thrive on competition as a seedling.)

Mixtures for southern Illinois. Legumes, other than lespedeza, and grasses may be seeded in either fall or spring. Seed lespedeza only in the spring. If you want a nurse crop, use ¾ to 1 bushel of Balbo rye or winter wheat for fall seedings or 1 bushel of oats for spring seedings.

For poorly drained flat prairie land:

A		B	
Lespedeza	6 pounds	Lespedeza	5 pounds
Sweet clover	4 pounds	Ladino	½ pound
Alsike clover	2 pounds	Timothy	4 pounds
Red clover	2 pounds	Tall fescue	3 pounds
Ladino	½ pound	Redtop	2 pounds
Timothy	3 pounds		
Orchard grass	3 pounds		

For well-drained soil:

A		B	
Alfalfa	6 pounds	Tall fescue	10 pounds
Lespedeza	5 pounds	Ladino	1 pound
Sweet clover	3 pounds		
Ladino	½ pound		
Bromegrass or tall fescue	4 pounds		
Timothy	3 pounds		

If tall fescue (Alta or Kentucky 31) is not a part of the mixture, it may well be the major grass in another field to be used as supplementary pasture in winter or early spring.

For rolling pastures that are hard to renovate properly and so will be left down for a long time:

Birdsfoot trefoil	6 pounds (special inoculant required)
Red clover	2 pounds
Tall fescue	4 pounds
Timothy or redtop	2 pounds

When to seed. Much improvement work on permanent pastures is done in late summer and early fall. Grasses usually do best when sown at this time of the year, so throughout the state grasses are commonly seeded in the fall and legumes added the following spring. The entire seeding may be made in the spring, however, if the lime that is needed can be applied far enough in advance. Some farmers partly prepare the seedbed in the fall and apply lime at that time. Then the following spring they finish preparing and fertilizing the seedbed and seed the legumes and grasses. Of course in the spring wet weather is more likely to interfere with working the ground and making the seeding than during the fall months.

In the southern half of the state, if the old pasture sod can be worked up and limed in the spring, the seedbed preparation necessary to control weeds during the summer will mix the limestone thoroughly with the topsoil. Then except for lespedeza, which is seeded only in the spring, both the legumes and grasses can be sown in late summer or early fall. If the mixture contains birdsfoot trefoil, it should be seeded by the first week in August. Fall seeding of legumes is not recommended for northern Illinois.

A fall seeding must be made early enough to make a good ground cover before winter. One advantage of early fall seedings over spring seedings is that they do not have to compete with the many annual warm weather weeds, such as crabgrass and foxtail. On rolling pastures a light seeding of small grain will help hold the soil. In southern Illinois, winter oats or winter barley can be used. Spring oats, seeded in early fall, make good cover before they are frozen. If the nurse crop makes enough growth to endanger the new seedings, it should be clipped back or pastured off.

How to seed. An excellent practice is to scatter the legume and grass seed on a firm rolled surface and then press the seed into the surface with a corrugated roller. Very little soil is needed to cover legume and grass seeds. Disking these seeds into the soil, as is done with oats, buries and kills many of the small seeds of legumes and grasses.

Pressing the seed into the ground with a corrugated roller helps greatly to insure a stand. Another machine which combines the corrugated roller with a seeder has also given good results.

STEP 4: CONTROL GRAZING

Use good judgment in grazing your pastures because overgrazing can easily result in losses that will cancel gains from soil treatment, renovation, and reseeding. If you protect your new seeding the first year, you will have a more vigorous pasture the second and succeeding years.

You can avoid overgrazing by using permanent pasture in combination with an ample acreage of rotation pastures of alfalfa or other meadow crops. Small grains, such as rye or winter wheat, and sweet Sudan grass may be used as supplementary pastures if needed. If the permanent-pasture field to be improved must be used early in the season, it may pay to work up only a part at a time. An electric fence will keep stock off the improved part while the new seeding becomes established. The next year you can treat and reseed the rest, while your stock get more feed from the part improved the first year than they formerly did from the entire pasture. By careful planning, you can make good use of your renovated permanent pastures without abusing them.

Pasturing the new seeding. Nurse crops can be pastured off during the early part of the season. But take care not to graze the pasture seeding too close. After the animals have grazed off the nurse crop, take them off and let the seeding recover before allowing further light grazing during the rest of the year. If no nurse crop is used, the time for turning on livestock may vary from early June to late August, depending on when there is enough growth. Grazing should then be moderate. Do not graze legumes between September 15 and October 20 because they build up food reserves in roots and crowns during this period. Summer or fall seedings should not be grazed the year they are seeded.

Second and succeeding years. Limit the grazing enough to maintain a fair top growth on the field at all times. If you have more than one field or can divide the pasture, a system of alternate or rotational grazing will provide more and better forage for your livestock. It also gives one pasture time to recover while another is being used.

STEP 5: CONTROL WEEDS BY CLIPPING

Most old pastures have a lot of weed seeds in the soil ready to take full advantage of the improvement practices. Weeds can endanger the new seedings by robbing them of needed sunlight and moisture as well as plant food. The good growth of legumes and grasses resulting from the soil treatment helps to keep down the weeds, but some additional control is usually needed.

Clipping weeds at least twice each year usually pays good dividends. Clipping in late May or early June for the early weeds and again in August for the later ones will usually do the job. But be sure to do the clipping before the weeds have gone to seed. Weeds, especially the perennials, are injured most by clipping when they start to bloom. If the second clipping is made in August, new seedings will have ample time during the fall to recover from the clipping and build up their root reserves. Adjust the height of the mower bar carefully. Weeds should be cut 3 to 4 inches above the ground, just low enough to set back the weeds with a minimum of damage to the new seedings.

Farmers who practice alternate grazing often clip the pasture near the end of each grazing period. This not only controls weeds but also lets any uneaten forage fall to the ground so the entire pasture can make a fresh even start.

Clipping weeds regularly keeps them from going to seed and saves the moisture, plant food, and sunlight for the legumes and grasses.

2,4-D can be used to control weeds in pastures when there are no legumes in the stand. It is particularly effective in controlling ragweeds, dandelions, buckhorn, and broadleaved plantain. It is also good for spot treatment of Canada thistle and similar weeds. But 2,4-D will also kill the legumes and this makes it undesirable for use in a mixed pasture.

CHANGE CROPLAND TO PASTURE BY THE SAME METHODS

Many farmers are interested in seeding down to permanent or semipermanent pasture all cropland which is likely to erode badly. A good permanent pasture stand is one of the best erosion-control measures on sloping fields. Also, a good pasture, well utilized, will on many fields make more cash return than will grain crops. As a result it is not uncommon to find farms which produce a minimum of grain crops or even none at all, most of the land being devoted to grasses and legumes.

Much the same in the way of soil treatment, seedbed preparation, seeding, and management is needed for a new pasture seeding as for renovation of an established permanent pasture. Most of the same practices and precautions apply and the same seeding mixtures may be used.

OTHER PASTURE PUBLICATIONS

Other details of pasture management are given in a number of Illinois publications. These include:

Supplementing and Improving Dairy Pastures. C-553.
Sweet Clover for Illinois. C-559.
How to Get Good Yields of Alfalfa. C-560.
Lespedeza — Its Place in Illinois Agriculture. C-561.
Red Clover for Illinois. C-627.
Pastures for Illinois. C-647.
Ladino Clover in Illinois. C-650.
Long Season Pastures for Illinois. C-682.

For copies of any of these publications, write to the College of Agriculture, University of Illinois, *Urbana, Illinois.*

Why Grow Better Pastures?

- **IDEAL FEED.** A mixture of high-quality legumes and grasses, fed at the right time, has almost an ideal protein content. On treated soil the mixture also runs high in the minerals and vitamins that livestock need in order to stay healthy and thrifty.

- **CHEAP FEED.** Milk and beef can be produced on good pasture for about half as much as they would cost otherwise. For fattening hogs, an acre of good legume-grass pasture saves 13 bushels of corn and 1,200 pounds of protein supplement. Lambs can be finished for market on pasture without grain.

- **SAVES LABOR.** An average dairy herd on pasture requires four hours less labor a day than a herd fed in a barn. Pasture needs no cultivation as a grain crop does, and is easily harvested just by opening the gate and letting the animals in to eat the forage and spread the manure.

- **SAVES SOIL AND WATER.** A good well-managed pasture soaks up many times as much water as a cultivated field with the same slope or a similar pasture that is overgrazed. The water saved means more forage and greater livestock gains. The soil loss from a good pasture is only a small fraction of that from a similar cultivated field.

- **ADDS ORGANIC MATTER.** The roots of a good legume-grass pasture add organic matter that most farms need badly. They also let more air into the soil, enable it to hold more water, and bring about better soil tilth.

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